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MECHANICAL COMPONENTS AND STRUCTURES IN NUCLEAR INSTALLATIONS. CONSTRUCTION INSPECTION

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1 GENERAL

This guide deals with the principles according to which the construction inspections of mechanical components and structures are carried out at nuclear power plants and other nuclear installations.

On the basis of their importance to safety, the components and structures are divided into the following areas of construction inspection:

- components and structures which shall be inspected by an inspector employed or assigned by the Finnish Centre for Radiation and Nuclear Safety (STUK)
- components and structures which shall be inspected by an inspector approved by STUK
- components and structures which need no construction inspection; the manufacturer and the power company are nevertheless responsible for their proper quality.

For the determination of the various areas, the power company shall submit to STUK for approval the flow sheets and the lists of components and structures, in which these areas of construction inspection have been specified (for example with different colours). The boundaries of the inspection areas are determined in accordance with the YVL Guides dealing with the structures or components in question.

The principles concerning the approval procedure of construction inspectors are given in Guide YVL 1.3. A construction inspection canot be performed until the construction plan has been accepted.

2 SCOPE

This guide is applied to the construction inspections required in YVL Guides.

3 DEFINITIONS

Construction inspection means inspections and tests which are primarily intended to ensure that a component or a structure has been manufactured and the quality control performed in accordance with the accepted construction plans. Additionally, it is ascertained in the construction inspection that the component or the structure has not been subjected to actions that are detrimental to their integrity during operation.

Mechanical components and structures mean pressure vessels, piping, ventilation ducts, pumps, fans, filters, valves, cranes, auxiliary craning devices, fuel handling devices, pool linings, and other such structures, as well as the construction materials and test pieces needed in their manufacture.

4 CONSTRUCTION INSPECTION AND ITS IMPLEMENTATION

A request for the inspection shall be submitted to STUK in accordance with Guide YVL 1.2. If the accessibility of a load-bearing structural part is impaired in the course of the manufacture, a part of the construction inspection shall be performed before the work is continued.

When necessary, the construction inspection is supplemented with supervision of manufacturing.

For the duration of the inspection, the power company

is obliged to provide the inspector with the construction plan accepted by STUK and supplemented with all the pertinent decisions and amendments, as well as the standards which are referred to in these documents. The construction inspection comprises the inspection of the documents resulting from the manufacture and from the quality control, the inspection of the structure, and the necessary pressure, loading, tightness, and function tests.

4.1 Quality control documents and their inspection

The documents shall include the reports specified in the quality control program, in guides and in other regulations.

The documents to be inspected shall be in a systematic order and they shall have the acceptance of the person responsible for manufacture or inspection activities. As concerns pressure vessels, the documents shall bear the signature of a supervisor of manufacture who is accepted by STUK. In addition, it is required that the documents have been accepted by the supplier of the plant and by the power company.

4.2 Inspection of structure

The inspection of the structure includes an inspection of the conformity between the accepted construction plans and the completed structure. In this connection there is a visual inspection, an identification of the construction materials, and, if necessary, other supplementary inspections.

Prefabricated pipes and ventilation ducts, pumps and valves of safety classes 1, 2 and 3 will undergo an inspection of the inside before they are mounted.

4.3 Pressure, loading and tightness tests

The pressure, loading and tightness tests that are part of the construction inspection can be performed after the inspection of the documents and the structure, and after the inspector has ascertained that everything is ready for the tests.

The section of piping that is pressure-tested at each time shall be clearly defined in the pressure testing program, and the openness of the lines shall be easily ascertainable.

The pressure test is performed according to Standard SFS 3321, and the loading tests of cranes and fuel handling devices according to Standard SFS 4261, unless a deviating procedure is accepted in the construction plan. The loading test of auxiliary craning devices is performed according to Resolution 356/059/74 issued by the National Board of Labour Protection on 27 March 1974.

4.4 Function tests

Function tests are carried out to the extent determined by the accepted construction plans or test programs. The person who requests for an inspection shall see to it that there exist sufficient facilities for performing the tests and for inspecting a component that is possibly disassembled after the test.

4.5 Record of construction inspection

On the basis of the inspection, the inspector prepares

a record, where the object of inspection is defined, along with the inspection performed. Deficiencies are recorded as comments in an appendix to the record of construction inspection, and the appendix is signed. A construction inspection is not approved and the record is not signed until the structure to be inspected has undergone all inspections and the comments, which were recorded in connection with the inspections, have been cleared up.

4.6 Stamps

The inspector stamps the inspection and identification marks required in the pertinent YVL Guides and standards on the nameplate, body and main parts of the component. The inspector shall also ascertain that the main parts and nameplate of the component have been provided with the other marks required by regulations.

5 REQUIREMENTS TO BE SET FOR THE MANUFACTURER AND THE POWER COMPANY

In a construction inspection, the manufacturer and the power company are responsible for the readiness of the object to be inspected and for the arrangements made for the inspection. The manufacturer or the importer is under an obligation to agree with the power company on dates that are suitable for a construction inspection. Here one must pay attention to the application procedures that may be associated with the various phases of manufacture, as well as to the inspections of a limited area forming a part of the construction inspection. Furthermore, the power company shall include in the procurement contract a provision, whereby it is possible to arrange audits to the manufacturing sites of the manufacturer and the sub-contractors, as provided in this guide.

To meet these requirements, the manufacturer shall pay extra attention to the following points:

1 The application for the construction inspection shall be made in good time before the planned date. The requests that are addressed to STUK shall be submitted through the power company.

2 During the inspection, the inspector shall have access to the necessary documents and materials.

3 The manufacturer shall ensure that there exist proper external conditions for the inspection and that the inspector is provided with the necessary equipment and assisting personnel.

4 The manufacturer shall see to it that the deviations and deficiencies detected in the construction inspection will be cleared up and eliminated.

6 BIBLIOGRAPHY

1 Guide YVL 1.2 Formal requirements for the documents to be submitted to the Institute of Radiation Protection, Dec. 1, 1976

2 Guide YVL 1.3 Mechanical components and structures of nuclear power plants. Inspection licenses, March 25, 1983

3 Guide YVL 1.8 Supervision of repairs and modifications on nuclear power plants during operation, Feb. 6, 1980

4	Guide YVL 2.1	Safety classification of nuclear power plant systems, structures and components, Rev. 1, Dec. 14, 1982
5	Guide YVL 3.0	Nuclear power plant pressure vessels. General guidelines on inspection, Feb. 7, 1978
6	Guide YVL 3.1	Nuclear power plant pressure vessels. Construction plan. Safety classes 1 and 2, Rev. 1, May 11, 1981
7	Guide YVL 3.2	Nuclear power plant pressure vessels. Construction plan. Safety class 3 and class EYT, June 21, 1982
8	Guide YVL 3.3	Supervision of the piping of nuclear facilities, May 21, 1984
9	Guide YVL 4.2	Nuclear power plant steel structures, Feb. 22, 1982
10	Guide YVL 5.3	Inspection of nuclear power plant valves, Nov. 26, 1979
11	Guide YVL 5.4	Inspection of nuclear power plant safety devices (under preparation)
12	Guide YVL 5.7	Inspection of nuclear power plant pumps, Dec. 14, 1977
13	SFS 3270	Inspection of pressure vessels. Construction inspection

14	SFS 3321	Inspection of pressure vessels. Pressure test
15	SFS 4261	Test of the hoisting appliances under overload conditions
16	356/059/74	Resolution of the National Board of Labour Protection concerning the regulations followed in the loading and unloading of vessels, and their application to craning devices.

In the event of any differences in interpretation of this guide, the Finnish version shall take precedence over this translation.